Age Does Matter: A Pilot Comparison of Placenta-Derived Stromal Cells for in utero Repair of Myelomeningocele Using a Lamb Model.

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Public Summary:
INTRODUCTION: Fetal amniotic membranes (FM) have been shown to preserve spinal cord histology in the fetal sheep model of myelomeningocele (MMC). This study compares the effectiveness of placenta-derived mesenchymal stromal cells (PMSCs) from early-gestation versus term-gestation placenta to augment FM repair to improve distal motor function in a sheep model. METHODS: Fetal lambs (n = 4) underwent surgical MMC creation followed by repair with FM patch with term-gestation PMSCs (n = 1), FM with early-gestation PMSCs (n = 1), FM only (n = 1), and skin closure only (n = 1). Histopathology and motor assessment was performed. RESULTS: Histopathologic analysis demonstrated increased preservation of spinal cord architecture and large neurons in the lamb repaired with early-gestation cells compared to all others. Lambs repaired with skin closure only, FM alone, and term-gestation PMSCs exhibited extremely limited distal motor function; the lamb repaired with early-gestation PMSCs was capable of normal ambulation.
DISCUSSION: This pilot study is the first in vivo comparison of different gestational-age placenta-derived stromal cells for repair in the fetal sheep MMC model. The preservation of large neurons and markedly improved motor function in the lamb repaired with early-gestation cells suggest that early-gestation placental stromal cells may exhibit unique properties that augment in utero MMC repair to improve paralysis. © 2015 S. Karger AG, Basel.

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